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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/761,240	01/17/2001	Josef-Georg Bauer	GR 98 P 2124 P	5138

7860 04/17/2003  
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EXAMINER

MONDT, JOHANNES P

ART UNIT PAPER NUMBER

2826

DATE MAILED: 04/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/761,240

Applicant(s)

BAUER ET AL

Examiner

Johannes P Mondt

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 27 February 2003 and 31 March 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☐ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other \_\_\_\_\_

**DETAILED ACTION*****Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/31/2003 has been entered.

***Response to Amendment***

Amendment D filed 02/27/2003 has been entered in response to the Request for Continued Examination. In Amendment D Applicant amended all of the outstanding claims 1-4.

***Response to Arguments***

Arguments as made in Remarks by Applicant included in the aforementioned Amendment D have been fully considered. Two main amendments to the independent claim language can be distinguished: (a) the stop zone in front of the emitter region should serve to prevent passage of an electric field to said emitter region at reverse voltage"; and (b) the "number of effective doping atoms generated in the stop zone changes in dependence on whether the power semiconductor element is in a blocking operation or in a conducting operation". As to (a), complete prevention is not possible and not disclosed; the verbiage "prevent passage" is thus to be interpreted as a notable reduction in the electric field, - in other words: a partial suppression, rather than a

Art Unit: 2826

complete elimination thereof (see disclosure, page 10, "very effective", as opposed to completely effective). However, a notable reduction of the electric field is both intended (cf. column 1 of page 2, lines 28-53) and disclosed (cf. Figure 6-7) by Stephani et al (EP 0 760 528 A2). Ad (b), in view of the selection by Stephani et al of both sulfur and selenium (cf. page 6, column 9, lines 4-10) as dopants in silicon (cf. abstract and page 3, column 3, lines 40-59) the means with which to achieve that the number of effective doping atoms generated in the stop zone changes depending on whether the device is in blocking or conducting operation, as expressed in Applicant's disclosure (cf. page 3, lines 13-22), is fulfilled, dependent as it is exclusively on the distance of the dopants' energy levels from the semiconductor's conduction and valence band levels. Therefore, upon further consideration, the rejection under 102(b) of claims 1-4 as being anticipated by Stephani et al must herewith, regrettably, be maintained.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. **Claims 1-4** are rejected under 35 U.S.C. 102(b) as being anticipated by Stephani et al (EP 0 760 528 A2). Stephani et al teach (cf. Figure 1) a power semiconductor element (see title and "Beschreibung", column 1 – column 2, line 8), comprising:  
an emitter region 2;

a stop zone 4 in front of the emitter region for preventing passage of an electric field to said emitter region at a reverse voltage, said emitter and stop zone having opposite conductivity types, and

said stop zone having (foreign (claim 4)) atoms of a doping substance determining a conductivity of said stop zone (column 3, line 54 – column 4, line 3), said atoms of said doping substance having at least one energy level within the band gap of the semiconductor and at least 200 meV away from both a conduction band and valence band of the semiconductor (claim 1), namely, in the case when the emitter zone is p-type and the abutting stop zone is consequently n-type, preferred atoms include sulfur (S) (donor level: 260 meV) (claims 2 and 4) and selenium (Se) (250 meV) (claims 3-4); wherein a number of effective doping atoms generated in the stop zone changes in dependence on whether the power semiconductor element is in a blocking operation or in a conducting operation by virtue of the considerable distance between the energy levels of the doping atoms from the conduction and valence band of the silicon. Both selenium and sulfur have at least one energy level within the band gap of silicon (Si) and are spaced at least 200 meV from the conduction band and valence band (edge) of silicon, while silicon is the semiconductor of which both regions 2 and 4 are made (claim 4).

In conclusion, then, Stephani et al anticipate claims 1-4.

**Conclusion**

2. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Rogwiller et al (4,642,669).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P Mondt whose telephone number is 703-306-0531. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J Flynn can be reached on 703-308-6601. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

JPM  
April 14, 2003

